DOCUMENT RESUME

ED 428 682 IR 019 343

AUTHOR Kitchenham, Andrew
TITLE Using Critical Thinking through CD-ROMs To Improve Reading Strategies of Reluctant and Remedial Readers.
SPONS AGENCY Malaspina Coll., Nanaimo (British Columbia).
PUB DATE 1998-06-00
NOTE 7p.; In: ED-MEDIA/ED-TELECOM 98 World Conference on Educational Multimedia and Hypermedia & World Conference on Educational Telecommunications. Proceedings (10th, Freiburg, Germany, June 20-25, 1998); see IR 019 307.
PUB TYPE Reports - Research (143) -- Speeches/Meeting Papers (150)
EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Computer Assisted Instruction; *Computer Games; Cooperative Programs; Courseware; *Critical Thinking; Elementary Secondary Education; Foreign Countries; Interaction; Models; Optical Data Disks; *Remedial Reading; Skill Development; Teacher Role; Thinking Skills
IDENTIFIERS British Columbia; *Reluctant Readers

ABSTRACT

Since 1993, the Critical Thinking Cooperative (TC2) has initiated projects with school districts and universities throughout British Columbia. To date, the main emphasis has been on social studies, with the exception of some recent work in language arts. This paper investigates the application of the TC2 model of critical thinking to computers, specifically, CD-ROMs and children who experience problems with reading. The three major components of the TC2 model--community of thinkers, critical challenges, and intellectual tools--are outlined, explaining how each forms an integral part of the model. The following five intellectual tools that make up the model are exemplified: background knowledge; criteria for judgement; critical thinking vocabulary; thinking strategies; and habits of mind. The ways that this model and these tools can be applied to CD-ROMs in the area of remedial reading are demonstrated, and examples from a popular CD-ROM adventure game, "Indiana Jones and the Search for Atlantis," are shown. Special attention is given to the interaction between the teacher and the reader. Data from ongoing research are presented, emphasizing the importance of having reluctant and remedial readers read small pieces of text over an extended period of time rather than having them read large passages and give up. Contains 10 references. (Author/DLS)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

Using Critical Thinking Through CD-ROMs To Improve Reading Strategies of Reluctant and Remedial Readers

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
☐ This document has been reproduced as received from the person or organization originating it.
☐ Minor changes have been made to improve reproduction quality.
• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

Dr. Andrew Kitchenham,
Malaspina University-College,
900 Fifth Street,
Nanaimo, B.C., Canada, V9R 5S5
tel: (250) 753 3245 local 2630
fax: (250) 741 2393
email: kitchenh@mala.bc.ca

ED 428 682

Abstract: Since 1993, the Critical Thinking Cooperative (TC^2) has initiated projects with school districts and universities throughout British Columbia, Canada. To date, the main emphasis has been on Social Studies with the exception of some recent work in language arts; however, no research has examined the application of this model to computers, specifically, CD-ROMs and children who experience problems with reading. This paper investigates this application of the model, concentrating on the intellectual tools (background knowledge; criteria for judgment; critical thinking vocabulary; thinking strategies; habits of mind), and discusses the author's data with remedial readers as they work through CD-ROM adventure games.

PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
G.H. Marks
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

Introduction

Critical thinking through technology has not been a major area of research in the last ten years nor has critical thinking been used extensively with struggling readers. This paper will examine the use of critical thinking through CD-ROMs to increase reading strategies in remedial and reluctant readers. First, I will outline the three major components of the critical thinking model adopted: (1) community of thinkers; (2) critical challenges; (3) intellectual tools, explaining how each forms an integral part of the model. Then, I will exemplify the five intellectual tools: (i) background knowledge; (ii) criteria for judgement; (iii) critical thinking vocabulary; (iv) thinking strategies; (v) habits of mind (see Figure 1). Next, I will demonstrate how this model and these tools can be applied to CD-ROMs in the area of Remedial Reading. Specifically, examples from a popular CD-ROM adventure game, *Indiana Jones and the Search for Atlantis*, will be shown and I will walk through each of the elements of the TC^2 model by modelling the questions asked of the reluctant or struggling reader. Special attention will be given to the interaction between the reader and the teacher so it is clear that the role of the teacher is, initially, the sage on the stage while the ultimate role of the teacher is to be the guide on the side to create an independent reader. The paper will end with a rationale of why this technique appears to be effective for this type of reader by presenting data from my on-going research and emphasizing the importance of having reluctant and remedial readers read small pieces of text over an extended period of time rather than having them read large reading passages and give up.

IR019343

BEST COPY AVAILABLE

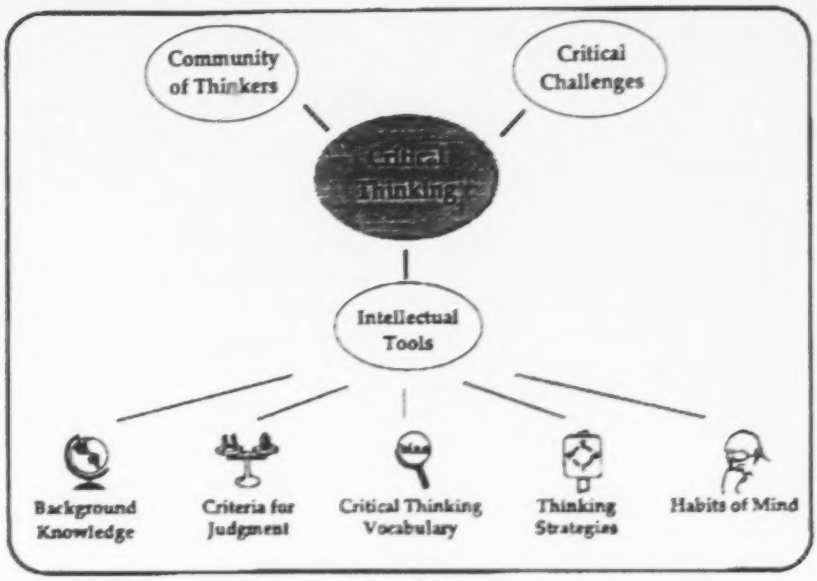

Figure 1: TC^2 Components

TC^2 Components

The TC^2 model [Bailin, Case, Coombs, & Daniels, 1993] has been used extensively in Social Studies [Case, Daniels, & Schwartz, [Eds], 1996] and recently, in Language Arts [Kitchenham, 1998, July], but to date, it has not been adopted in technology studies. The TC^2 model proposes that there are three components which will promote critical thinking in the classroom [Bailin, Case, Coombs, & Daniels, 1994]: (1) community of tools; (2) critical challenges; (3) intellectual tools. A *community of thinkers* is a classroom in which reflective inquiry is valued and that is driven by the premise that critical thinking is not the work of an individual but rather relies on other like-minded individuals [Vygotsky, 1987]. The *critical challenges* are the problematic situations set for the students to complete and are guided by four questions (Does the question or task require judgement?; Will the challenge be meaningful to students?; Does the challenge address key aspects of the subject matter?; Do students have the tools or can they reasonably acquire the tools needed to competently address the challenge?). These challenges appear to be based on a information processing model [Piaget, 1970]. The intellectual tools will be discussed in the next section, [Intellectual Tools].

Intellectual Tools

The intellectual tools component is a fundamental element of the TC^2 model of critical thinking. There are five intellectual tools: (1) Background knowledge is the information about a topic required for thoughtful reflection. (2) Criteria for judgement are those criteria or grounds for deciding which of the alternatives is the most sensible or appropriate for the critical challenge. (3) Critical thinking vocabulary is defined as the range of concepts and distinctions that are helpful when thinking critically. (4) Thinking strategies are the repertoire of strategies, heuristics,

BEST COPY AVAILABLE

organizing devices, and algorithms that may be useful when thinking through a critical thinking problem. (5) Habits of mind are the values and attitudes of a careful and conscientious thinker [McDiarmid, Manzo, & Musselle, 1996].

It needs to be stressed that the TC^2 model, in general, and the intellectual tools, in particular, are grounded in educational psychology theories and, therefore, are very reliable. Vygotsky's *zoped*, or zone of proximal development, is prevalent in the model as the student is moved from his present ability level towards his potential ability level with the assistance of a more experienced reader and thinker [Vygotsky, 1987]. In addition, the notion of scaffolding thinker [Vygotsky, 1987] is built in the model since the student works through various levels of mastery and builds on his own *background knowledge* in an attempt to beat the computer. It is, without a doubt, an information processing model and finds support in the Piagetian notion of child development [Piaget, 1970]. Lastly, it is built on the idea of a taxonomy and includes many of the higher order thinking skills and concepts argued the pioneers of educational taxonomies [Anderson & Sosniak, 1994].

Application to CD-ROMs and Struggling Readers

This model, as applied to reluctant and remedial readers, is quite successful. The primary method of delivering the model to the student is through question and answer emphasizing the five intellectual tools required. Although it is not necessary to include all five tools when applying the model to competent readers, for struggling readers, it is far more advantageous if the teacher attempts to include each of the five intellectual tools.

Initially, the teacher discusses the *background knowledge* needed to understand the game. Specifically, the teacher and the student review (or teach) the characteristics of an adventure CD-ROM such as a quest to be performed by a main character, puzzles to be solved, decisions for which a strategy or tool would be required to master a particular level, and the need to remember codes to go back to starting points in the various levels of the game. In many cases, the reader is quite familiar with these characteristics but they need to be brought to the forefront so that the student remembers them throughout the game. For the more inattentive (e.g., ADD) or distractible students (e.g., ADHD), the qualities of a CD-ROM adventure game are displayed above or beside the computer monitor. In this way, the teacher can make several references to the characteristics as a memory cue or can point to them whenever the student does nor remember them. Within the *background knowledge* concept would the notion that content and procedural knowledge would be transferred from one adventure game to another. In other words, if a student knew that scanning the rooms in the adventure games, *Myst* and *Riven*, meant finding necessary clues and artefacts in that game, then he may be more inclined to apply the strategies and knowledge to *Indiana Jones and the Search for Atlantis*.

In addition, the *criteria for judgement* are continually reviewed. For the most part, the student and teacher go through a series of five "generic" questions:

- Is my estimate accurate?
- Is the interpretation plausible?
- Are our sources reliable?
- Is the conclusion fair to all?
- Is my proposal feasible?

In the case of *Indiana Jones and the Search for Atlantis*, the student might consider whether Indiana Jones would need to take a "logic" route, a "fist" route, or a "team" route and estimate the pros and cons of each route. He may go through an inner-speech dialogue [Berk, 1992] weighing working with Sophia ("team") versus fighting his way through the game ("fist") and decide that working with another person would slow down Indiana Jones (i.e., plausible interpretation). The

reader might consider his sources very carefully by looking at a clue book, talking to other players, checking for websites, or considering his past performance in the game. The issue of fairness is quite clear in the "team" route as Indiana has to make many decisions which jeopardize both his and Sophia's lives so discussing the choice with the teacher before executing it is paramount and continuously emphasized throughout the session. Lastly, the student is asked to make predictions at virtually every screen and level of the game and to evaluate whether the proposed prediction is feasible. In *Indiana Jones and the Search for Atlantis*, he needs to decide in which order to perform certain tasks or which of the objects he possesses would be useful and how to use it in a logical or creative manner.

Throughout the sessions, the student is cognizant of any *critical thinking vocabulary* that may be used in the course of the game. For example, in the "fist" route, the student may notice through "direct observation" that he should hit the soldier first and continuously or Indiana will tire while his "inference" may be that the more times he gets in a fight without a rest, the faster Indiana will "die" and the game will be over. Other key vocabulary would include "logic," "informed decision," "generalization/overgeneralization," "educated guess," extrapolate," and "cooperate."

In addition, the *thinking strategies* needed to master the game, such as decision making models, information organization, and role taking, are either modelled by the teacher or discussed between the teacher and the student. Clearly, in *Indiana Jones and the Search for Atlantis*, decision making models are a constant. As stated earlier, the player has to decide which of the three routes to take which, in turn, dictates various paths and levels already programmed into the game; which tools to use in which order; whom can he trust and who is an enemy; which responses in which order will get the answer to a puzzle; which response to a friend or enemy will result in success or failure; and the list goes on. When Indiana is in the maze, an information organizer such as drawing a rough sketch of which rooms contain certain machines or artifacts is extremely helpful in remembering how to get out of the rooms without running into soldiers. And role taking is also an excellent thinking strategy for this CD-ROM. Whenever Indiana has to make a major decision, the teacher encourages the student to put himself in Indiana's shoes and to think through what may happen or what Indiana may be feeling which may, in turn, affect how he will react. In short, the student tends to use higher order thinking skills [Anderson & Sosniak, 1994] and hypothetical reasoning [Piaget, 1970].

Lastly, there are the four *habits of mind*: (1) open-minded; (2) fair-minded; (3) independent-minded; (4) inquiring attitude. Throughout this game, the student is encouraged to pursue his own hypotheses for what might happen based on a choice he makes (e.g., leaving Sophia by herself, knowing that she could be kidnapped); however, he is also expected to consider evidence which refutes his hypothesis and to make a new hypothesis, using the new evidence (i.e., open-minded). Often, the teacher will pose an alternative point of view to the student (e.g., Sophia may be able to help Indiana work out how to get the knife from the knife-thrower in Algiers), expecting that the student will argue or accept the new view, temporarily (i.e., fair-minded). In this challenge, the student sometimes will not accept the new hypothesis (i.e., independent-minded); however, he must always supply concrete evidence for why he is standing behind his view (e.g., last time, Indiana was trapped when he went into the machine room). Consistently, the reader must question his own claims (i.e., inquiring attitude) and be willing to seek justification, when needed (e.g., taking a balloon versus the camel to cross the desert).

Rationale

Now, to why this technique seems to be effective for the struggling reader. Based on my

on-going research, there are three salient reasons this technique is so successful: (1) the reading material; (2) the familiarity of the genre; (3) the series of mini-successes which build to the major goal.

Based on my ten years of working with struggling readers, I feel confident in saying that most reluctant and remedial readers do not like to read for long periods of time. When they do read, it is usually material which is pleasurable for them and chosen by them. The reading material in *Indiana Jones and the Search for Atlantis* is between the grade three and grade seven reading levels (based on a modified Fry readability formula), but more importantly, the passages are quite short so that the struggling---either reluctant or remedial---reader believes that he is receiving manageable sections of text. In fact, the student reads about 10 to 12 words in each line of dialogue so with four lines of dialogue, the student reads approximately 2000 words over a thirty-minute period. In addition, much of the dialogue has an immediate payoff so that the reader knows that he will be moving on in the game whereas in many books and short passages, the reader has to wait a long time to see the evidence of his hard work of slogging through the text. The familiarity of the Indiana Jones movies and videos also adds to the overall understanding. Lastly, the reader tends to feel empowered as he is making many of the decisions in reading even though the teacher has both direct and indirect input.

Many children are familiar with the genre of CD-ROM adventure games and therefore, the teacher is beginning with a framework with which students are already comfortable. In my private practice, I have discovered that over 90 percent of the struggling readers know that the CD-ROM adventure game frequently involves a quest, it has some form of puzzles, and that the player must always be ready for surprises---not to mention, remembering to save the game a lot! My latest observations of children working with the next generation of *Myst*, indicates that *Riven* may be even more successful based on the child's familiarity with *Myst*. Lastly, the remedial and reluctant reader knows that good will overpower evil as long as he knows how to get there.

Adventure games are based on a building-blocks, or scaffolding [Beyer, 1997] concept. As the player learns more strategies, acquires more tools, codes, or artifacts, and learns from his mistakes, the pace of the game increases but also, the level of the game increases. That is, the game allows the player to receive a series of successes which enables him to move toward the end goal [Vygotsky, 1987] of winning the game and "beating the computer." For a struggling reader, seeing tangible evidence of these victories in the form of moving through a level faster the second or tenth time or knowing that a particular response will cause the villain to react in a certain manner is absolutely crucial.

Conclusion

In sum, the TC^2 model, using popular CD-ROM games, clearly increases the reading strategies of remedial and reluctant readers. Paramount is the confidence these readers have after several hours of working with the genre. There are other strategies. The remedial student understands the importance of anticipation and prediction which are major elements of the reading process; he increases his sight vocabulary and has many words reinforced throughout the game; he learns the importance of metacognitive (inner) dialogues. The reluctant reader tends to become a risk-taker and will attempt to sound out or guess at unfamiliar words; he will read voluntarily even if it is only for a slightly longer time; he often makes predictions based on previous passages or prior knowledge. Both the remedial and reluctant reader also learn about the importance of sources for clarification. Thus far, this model and the use of CD-ROM adventure games has proven to be more successful than any technique I have used in the past.

References

[Anderson & Sosniak, 1994] Anderson, L. W. & Sosniak, L. A. (1994). *Bloom's Taxonomy: A forty-year retrospective*. Chicago, IL: National Society for the Study of Education.

[Bailin, Case, Coombs, & Daniels, 1993] Bailin, S., Case, R., Coombs, J., & Daniels, L. (1993). *A conception of critical thinking for curriculum, instruction and assessment*. Unpublished report to Examinations Branch, Ministry of Education, Victoria, B.C.

[Bailin, Case, Coombs, & Daniels, 1994] Bailin, S., Case, R., Coombs, J., & Daniels, L. (1994). A conception of critical thinking for curriculum, instruction and assessment. *Horizon*, 32 (1), 5-16.

[Berk, 1992] Berk, L. E. (1992). Children's private speech: An overview of theory and the status of research. In R. M. Diaz & L. E. Berk (Eds.), *Private speech: From social interaction to self-regulation*. Hillsdale, NJ: Erlbaum.

[Beyer, 1997] Beyer, B. K. (1997). *Improving student thinking: A comprehensive approach*. Toronto, ON: Allyn and Bacon.

[Case, Daniels, & Schwartz, [Eds.] 1996] Case, R., Daniels, L., & Schwartz, P. (Eds.) (1996). *Critical challenges in Social Studies for junior high students*. Burnaby, B.C.: Field Relations, Faculty of Education, Simon Fraser University.

[Kitchenham, 1998, July] Kitchenham, A. D. (1998). *Applying critical thinking to literature from around the world*. Paper to be presented at the meeting of the World Congress on Reading in Ocho Rios, Jamaica.

[McDiarmid, Manzo, & Musselle, 1996] McDiarmid, T., Manzo, R., & Musselle, T. (1996). *Critical challenges for primary children*. Burnaby, B.C.: Field Relations, Faculty of Education, Simon Fraser University.

[Piaget, 1970] Piaget, J. (1970). *The science of education and the psychology of the child*. New York: Orion Press.

[Vygotsky, 1987] Vygotsky, L. S. (1987). *Mind in society: The development of higher psychological process*. Cambridge, MA: Harvard University Press.

Acknowledgements

The presentation of this research was partially supported by TC^2, Malaspina University-College, and the Rural Communitues Research and Development Centre. The data presented, the statements made, and the views expressed are solely the responsibility of the author.